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EXAMINER
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ART UNIT	PAPER NUMBER
2306	4

DATE MAILED: APR 27 1992

This is a communication from the examiner in charge of your application.
COMMISSIONER OF PATENTS AND TRADEMARKS

☒ This application has been examined ☐ Responsive to communication filed on _____ ☐ This action is made final.

A shortened statutory period for response to this action is set to expire 3 month(s), ___ days from the date of this letter.
Failure to respond within the period for response will cause the application to become abandoned. 35 U.S.C. 133

Part I THE FOLLOWING ATTACHMENT(S) ARE PART OF THIS ACTION:

1. ☒ Notice of References Cited by Examiner, PTO-892.
2. ☒ Notice re Patent Drawing, PTO-948.
3. ☐ Notice of Art Cited by Applicant, PTO-1449.
4. ☐ Notice of Informal Patent Application, Form PTO-152.
5. ☐ Information on How to Effect Drawing Changes, PTO-1474.
6. ☐ _____

Part II SUMMARY OF ACTION

1. ☒ Claims 1-17 are pending in the application.

   Of the above, claims _____ are withdrawn from consideration.

2. ☐ Claims _____ have been cancelled.

3. ☐ Claims _____ are allowed.

4. ☒ Claims 1-17 are rejected.

5. ☐ Claims _____ are objected to.

6. ☐ Claims _____ are subject to restriction or election requirement.

7. ☐ This application has been filed with informal drawings under 37 C.F.R. 1.85 which are acceptable for examination purposes.

8. ☐ Formal drawings are required in response to this Office action.

9. ☐ The corrected or substitute drawings have been received on _____. Under 37 C.F.R. 1.84 these drawings are ☐ acceptable. ☐ not acceptable (see explanation or Notice re Patent Drawing, PTO-948).

10. ☐ The proposed additional or substitute sheet(s) of drawings, filed on _____ has (have) been ☐ approved by the examiner. ☐ disapproved by the examiner (see explanation).

11. ☐ The proposed drawing correction, filed on _____, has been ☐ approved. ☐ disapproved (see explanation).

12. ☐ Acknowledgment is made of the claim for priority under U.S.C. 119. The certified copy has ☐ been received ☐ not been received ☐ been filed in parent application, serial no. _____ ; filed on _____.

13. ☐ Since this application appears to be in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under Ex parte Quayle, 1935 C.D. 11; 453 O.G. 213.

14. ☐ Other

EXAMINER'S ACTION

1. 35 U.S.C. § 101 reads as follows:

> "Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter or any new and useful improvement thereof, may obtain a patent therefore, subject to the conditions and requirements of this title".

Claims 11-17 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

The basis of this rejection is set forth in the two-step test given by In re Freeman 197 USPQ 464 (CCPA 1980), as modified by In re Walter 205 USPQ 397 (CCPA 1982), In re Abele 214 USPQ 682 (CCPA 1982). See In re Meyer 215 USPQ 193, 198 (CCPA 1982).

The first step of determining the Freeman-Walter-Abele test is to determine whether or not the claims directly or indirectly recite a mathematical algorithm. As can be seen by claim 11, claim 11 indirectly recites a mathematical algorithm by setting forth the steps of "for each axis, determining ... for each axis, computing ... recursively summing the stored values for successive units of measure to compute new position values."

Once the first step of the Freeman-Walter-Abele test is met, the claim, as a whole must be analyzed as to whether or not the claim preempts a mathematical algorithm. See In re Abele 214 USPQ 682, 685 (CCPA 1982); In re Iwahashi 12 USPQ 2d 1908, 1911 (CAFC 1989); and In re Grams 12 USPQ 2d 1824, 1827 (CAFC 1989). In order to make this determination, the claims should be viewed without the mathematical algorithm to determine if what remains

is otherwise statutory In re Abele 214 USPQ 682, 686 (CCPA 1982) and In re Grams 12 USPQ 2d 1824, 1827. Rewriting claim 1 without the mathematical steps, we have the following claim:

A method for generating a geometric design in a tangible form, comprising the steps of:

parametrically representing the design along respective axes for successive units of measure, where each axis corresponds to a dimension of the design;

representing each of the position values along the respective axes in a tangible media.

The courts have held that a field of use limitation cannot make a claim statutory be "attempting to limit the use of the formula to a particular technological environment." Diamond v. Diehr 209 USPQ 1, 10 (S. Ct 1981). Thus applicant's field of use limitation fails to render the claim statutory.

Furthermore, the applicant only recites a data gathering step in the following claim 11 step which is as follows: parametrically representing the design along respective axes for successive units of measure, where each axis corresponds to a dimension of the design. The courts have ruled that data gathering steps do not render the claim statutory.

The courts have held that:

"No mathematical equation can be used as a practical matter, without, establishing and substituting values for the

variables expressed therein. Substitution of values dictated by the formula has thus been viewed as a form of mathematical step. If the steps of gathering and substituting values were alone sufficient, every mathematical equation, formula, or algorithm having any practical use would be per se subject to patenting as a "process" under 101. Consideration of whether the substitution of specific values is enough to convert the disembodied ideas present in the formula into an embodiment of those ideas, or into an application of the formula, is foreclosed by the current state of Law."

In re Sarker 200 USPQ 132,139 (CCPA 1978), In re Grams 12 USPQ 2d 1824, 1828. The courts go further in In re Christensen 178 USPQ 35, 37-38 (CCPA 1973):

"Given that the method of solving a mathematical equation may not be the subject of patent protection, it follows that the addition of old and necessary antecedent steps of establishing values for the valuables in the equation cannot convert the unpatentable method of patentable subject matter" See In re Richman 195 USPQ 340,343, (CPA 1977) an In re Meyer 215 USPQ 193, 195, (CCPA 1982).

As to claim 11's final step of representing each of the position values along the respective axes in a tangible media, this step amounts to insignificant post-solution activity. The courts have held that any non-essential "post-solution"

activity fails to render the claims statutory. See Parker v. Flook 198 USPQ 193, 197 (S Ct 1978). Many different types of insignificant post-solution activity have been dealt with by the courts: the transmission of data In re Castelet 195 USPQ 439, 446 (CCPA 1977), the display of the analog equivalent of a number (a shade of gray) In re Abele 214 USPQ at 688, and the updating of an alarm limit Parker v. Flook.

Thus, it is readily apparent that when claim 11 is taken as a whole, the claim is directed to the preemption of a mathematical algorithm, and thus is non-statutory under U.S.C. 101. Claims 12-17, merely recite additional computational steps for the mathematical algorithm in claim 11.

2. The following is a quotation of the first paragraph of 35 U.S.C. § 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The specification is objected to under 35 U.S.C. § 112, first paragraph, as failing to adequately teach and/or make the invention, i.e. failing to provide an enabling disclosure.

The specification fails to discloses how each term of the polynomial in the recursive addition step found on page 12 and step 3 in figure 3 is determined by application of a formula to

preceding terms. In fact, a recursive formula is defined as a mathematical expression as a polynomial each term of which is determined by application of a formula to preceding terms. It would require undue experimentation for one of ordinary skill in the art to preform the recursive addition step (step 3 of figure 3) without a mathematical function expressing how each term of the polynomial is determined based of preceding terms.

3. Claims 1-17 are rejected under 35 U.S.C. § 112, first paragraph, for the reasons set forth in the objection to the specification.

4. Claims 4-10 and 14-15 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 4, steps (a) and (b) are not related to each other. The limitations of step (a) are not utilized or relied upon in step (b). Claims 5-10 incorporate the deficiencies of claim 4 by dependency.

In claim 14, "said representing step comprises removing some of the material from the block, with a tool, at locations determined by said position value." is deemed to be vague. A machining step can perform the step of removing some of the material from the block, but a representing step cannot. Claim 15 incorporates the deficiencies of claim 14 by dependency.

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless --
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1-6 are rejected under 35 U.S.C. § 102(b) as being anticipated by Daggett (4,876,494).

As per claims 1-6, Daggett discloses a digital position and velocity feedback system for a multi-axis robot control which employs an LSI chip to process incremental position signals for position change and velocity computations. Daggett further discloses in columns 5 and 6, a discussion of a of the control loops and in columns 8 and 9, a discussion of a LSI incremental position feedback processor.

7. Claims 1-6 are rejected under 35 U.S.C. § 102(b) as being anticipated by Woodman et al (4,777,603).

As per claims 1-6, Woodman discloses a controller for multiple-axis machine in figure 1, comprising a single computational device (controller 30), a plurality of motors 14, and a plurality of feedback devices (encoders 14). Woodman further discloses controlling the movement of a tool relative to a workpiece along each one of a plurality of axes by digitally providing a train of digital pulses to an actuator and by digitally modulating the pulse widths.

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tom Brown whose telephone number is (703) 308-0754.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-0785.

THOMAS BROWN
PATENT EXAMINER
GROUP 230

Tom Brown
April 23, 1992

Jerry Smith
JERRY SMITH
SUPERVISORY PATENT EXAMINER
ART UNIT 236